VME/SMD Disk Controller Upgrade Instructions

Part No: 813-1043-05
Revision A of August 4, 1988

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Introduction

This procedure allows you to upgrade your Sun-3/100 series, Sun-3/200 series and the Sun-4 series of machines for use with the VME/SMD Disk Controller.

1.1. Other Documentation You Will Need

- VME/SMD Disk Controller Configuration Procedures
  Sun P/N 813-2033-xx
- VME/SMD Disk Controller Installation Note
  Sun P/N 813-1027-xx
- Installing the SunOS™ (4.0)
  Sun P/N 800-1732-xx
- Cardcage Slot Assignments and Backplane Configuration Procedures
  Sun P/N 813-2004-xx
- Cardcage Slot Assignments and Backplane Configuration Procedures for the VME/SMD Disk Controller
  Sun P/N 813-2051-xx
- SunOS Reference Manual
  Sun P/N 800-1751-xx
- System Administration and Networking Manual
  Sun P/N 800-1733-xx

Hardware You Will Need

The items mentioned below are the hardware needed for the upgrade. The first three items are included in the upgrade kit.

- CPU Boot PROM (Sun-3/1X0 or Sun-3/2X0)- ***not needed for Sun-4***
  Install at location C5 of CPU Board for Sun-3/160 or 180
  Install at location C1 of CPU Board for Sun-3/260 or 280

NOTE *Boot PROM Revision 2.7 is the **minimum** Boot PROM requirement for **all** Sun-3 CPUs. The VME/SMD Disk Controller cannot operate without this minimum requirement.*

- VME/SMD Disk Controller (also know as the Xylogics 7053)
  Check all the jumpers on this Disk Controller as indicated in the *VME/SMD Disk Controller Configuration Procedures*.

- ☐ Command and Data Cables
- ☐ Back-up storage device. This device can be either directly connected to your system, or accessible over the network. This device *can* be a disk drive if it is not a drive connected to the Disk Controller targeted for upgrade.

Software You Will Need

- ☐ SunOS operating system Release 4.0 software distribution tapes

NOTE *If you did not order the Sun Feature Tape when you first ordered your Sun VME/SMD Disk Controller board, you should do so now.*

- ☐ Sun Feature Tape

Order Number	**For**
FM2-4.0-07	¼-inch 68020 4.0 Feature Tape
FM2-4.0-08	½-inch 68020 4.0 Feature Tape
FS1-4.0-07	¼-inch SPARC 4.0 Feature Tape
FS1-4.0-08	½-inch SPARC 4.0 Feature Tape

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Upgrade Instructions

It is ***HIGHLY*** recommended that you read all of Appendix A before proceeding with the upgrade instructions detailed below.

2.1. System Back-up

The upgrade procedure will destroy existing data on any disk drives connected to the controller being upgraded. Therefore, if you wish to retain the data on these disks, it is necessary to back up the disk data onto tape before beginning the upgrade procedure. The SunOS utilities `dump` and `tar` can be used for this purpose.

2.2. Upgrade Procedure

CAUTION

Once this upgrade procedure is complete, the DIAG utility will no longer be available. However, the `format` utility replaces DIAG and has increased functionality when compared to DIAG. The Appendix of this manual provides an in-depth example of the `format` utility for use during the upgrade procedure. However, as stated at the beginning of this manual, you should also have the following manuals available during the upgrade: *System Administration and Networking Manual* **and** *Installing the SunOS™*. **These manuals will be able to answer any in-depth questions you may have.**

System Configurations

The method of upgrade depends on the configuration of your system, and it is important that the user be familiar with the configuration of the system targeted for upgrade. Three different configurations are mentioned below.

Procedure

Step 1 If you have a system disk running 4.0 SunOS software and it is not attached to the controller targeted for upgrade, you can skip to Step 2.

If there is a system disk *not running* 4.0 SunOS software ***and*** it is not attached to the controller targeted for upgrade, you will need to build 4.0 SunOS software on this disk. After building 4.0 SunOS, follow the procedure in Step 2. Refer to *Installing the SunOS* for information on how to build the 4.0 SunOS operating system.

If there is no system disk other than the one attached to the controller targeted for upgrade, you will need to bring up MUNIX in your local memory. Appendix A gives you an in-depth example of how to do this.

NOTE *Before running* `format` *under MUNIX, you must create the proper entries in the /dev directory for the disk drive(s) targeted for upgrade and for the tape device used to back-up the defect list. The MAKEDEV command should be used for creating these entries. Furthermore, you must boot MUNIX with the "-asw" flags so as to be able to create these entries.* ***If these entries are not made,*** **`format`** ***will not be able to access your disk or tape device.***

After bringing up MUNIX, skip to Step 3 of this Section. If necessary refer to Installing the SunOS for more detailed information on how to install and boot MUNIX.

Step 2 Boot with your system disk.

NOTE *In the following steps, refer to Appendix A* — The Format Utility and MUNIX *and/or the manual entitled* System Administration and Networking *for specific details on defect list management and disk formatting.*

Step 3 Store the Defect List. During the upgrade procedure, the defect list(s) of the drive(s) connected to the controller being upgraded will be destroyed. Therefore, it is necessary to extract and store the defect list(s) from the affected drive(s) before beginning the upgrade. The list is needed to reformat the drive(s) using the new controller.

To back-up (store) the defect list of your drive, perform the following steps:

a. Enter the `format` utility by typing:

```
format
```

b. After you have selected your disk, the following message should be displayed:

```
[disk formatted, defect list found]
```

If you did receive this message, skip to Substep f.

c. If you receive the message:

```
[disk formatted, defect list not found]
```

enter `defect` (for defect list management) from the `format>` prompt. Use the `extract` command to recover the defect list from the drive and go on to Substep f.

d. If the `extract` command fails and a paper copy of the defect list is available, enter the defect list by hand. Then go on to Substep f.

e. If the `extract` command fails and no paper copy of the defect list is available, format the disk with no defect list. Then perform a surface analysis for at least 10 passes. Go on to Substep f.

f. Enter `defect` (for defect list management) from the `format>` prompt, and use the `dump` command to dump the defect list to a file on your system disk.

NOTE *If you are operating from* MUNIX, *you must copy the defect list information to a tape or it will be lost:* MUNIX *is only a temporary file system. After you have used the* `dump` *command from Substep f, use the* `tar` *command to copy the information to a tape.*

For more information about the above procedures, please refer to Appendix A in this manual or the Chapter on the `Format` *utility in the System Administration and Networking manual.*

Graceful Power–Down

To power-down the system, ensure that either you or the system administrator perform the following steps.

1. Warn clients or other workstation users to log out.
2. As super–user, enter a command such as:

   `/etc/halt` or `/etc/fasthalt`

When the SunOS operating system has halted, the screen will display the root monitor prompt (the greater than symbol `>`). You may now turn the system power off.

2.3. VME/SMD Disk Controller Installation

Replace the Xylogics 450 or 451 Disk Controller that has been targeted for upgrade with the new VME/SMD Disk Controller.

For installation instructions for the new disk controller, refer to the manuals; *VME/SMD Disk Controller Installation Notes*, *VME/SMD Disk Controller Configuration Procedures* and the *Cardcage Slot Assignments and Backplane Configuration Procedures for the VME/SMD Disk Controller*.

For cabling instructions for upgrades, refer to the following Chapter and to the installation manuals for the disk drives connected to the controller being upgraded.

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Cabling and Upgrade Procedure Completion

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3

Cabling and Upgrade Procedure Completion

3.1. Cabling

The Figures in this Chapter show the cabling necessary to connect the new VME/SMD Disk Controller to your disk drive(s).

- ☐ Figure 3-1 shows the Sun 900 Mbyte Drive in its maximum configuration of four drives. This four drive configuration would only be possible in a Sun 230 or 240 Volt Rack.
- ☐ Figure 3-2 shows a two drive configuration for the other rack-mountable SMD drives offered by Sun. A two drive configuration would be the maximum possible in a Sun Rack.
- ☐ Figure 3-3 shows the Sun Mass Storage Pedestal in its most complex configuration. This configuration uses two VME/SMD Disk Controllers to control four 280 Mbyte Drives housed inside two Storage Pedestals.

The following Table lists a number of important restrictions that should be remembered while performing the Disk Drive Controller Upgrade.

Table 3-1 *Upgrade System Configuration Restrictions*

System Rack Restrictions (3/180, 3/280, 4/280)	
Rack Operating Voltage	*Restrictions*
230/240 Volt	*Maximum Number of Disk Drives*
	Four 900 Mbyte Drives
	Two 575 Mbyte Drives
	One 575 Mbyte Drive **and** Two 900 Mbyte Drives
115 Volt	*Maximum Number of Disk Drives*
	Two 575 Mbyte Drives
	Two 900 Mbyte Drives
	One 575 Mbyte Drive **and** One 900 Mbyte Drive
Storage Pedestal Restrictions (3/160, 3/260, 4/260)	
Number of Drives Per Storage Pedestal	*Restrictions*
One or Two	Maximum of one pedestal per controller
	Maximum of two pedestals per system
	Storage pedestal cannot be daisy-chained to another storage pedestal or any other storage device
Drive Controller Restrictions	
Type of Controller presently in System	*Restrictions*
None	Maximum of 4 VME/SMD Disk Controllers
Xylogics 451	Maximum of One 451 and Two VME/SMD Disk Controllers
Xylogics 450	The VME/SMD Controller CANNOT BE USED in the same system as a Xylogics 450

CAUTION **DISK DRIVE RESTRICTIONS**

Because the 900 Mbyte Drive uses different Command, Data, and Daisy Chain cables than the other Sun SMD Disk Drives, all 900 Mbyte Drives *must* be on a separate Disk Controller.

Figure 3-1 *Cabling for the Sun 900 Mbyte Drive - Four Drives*

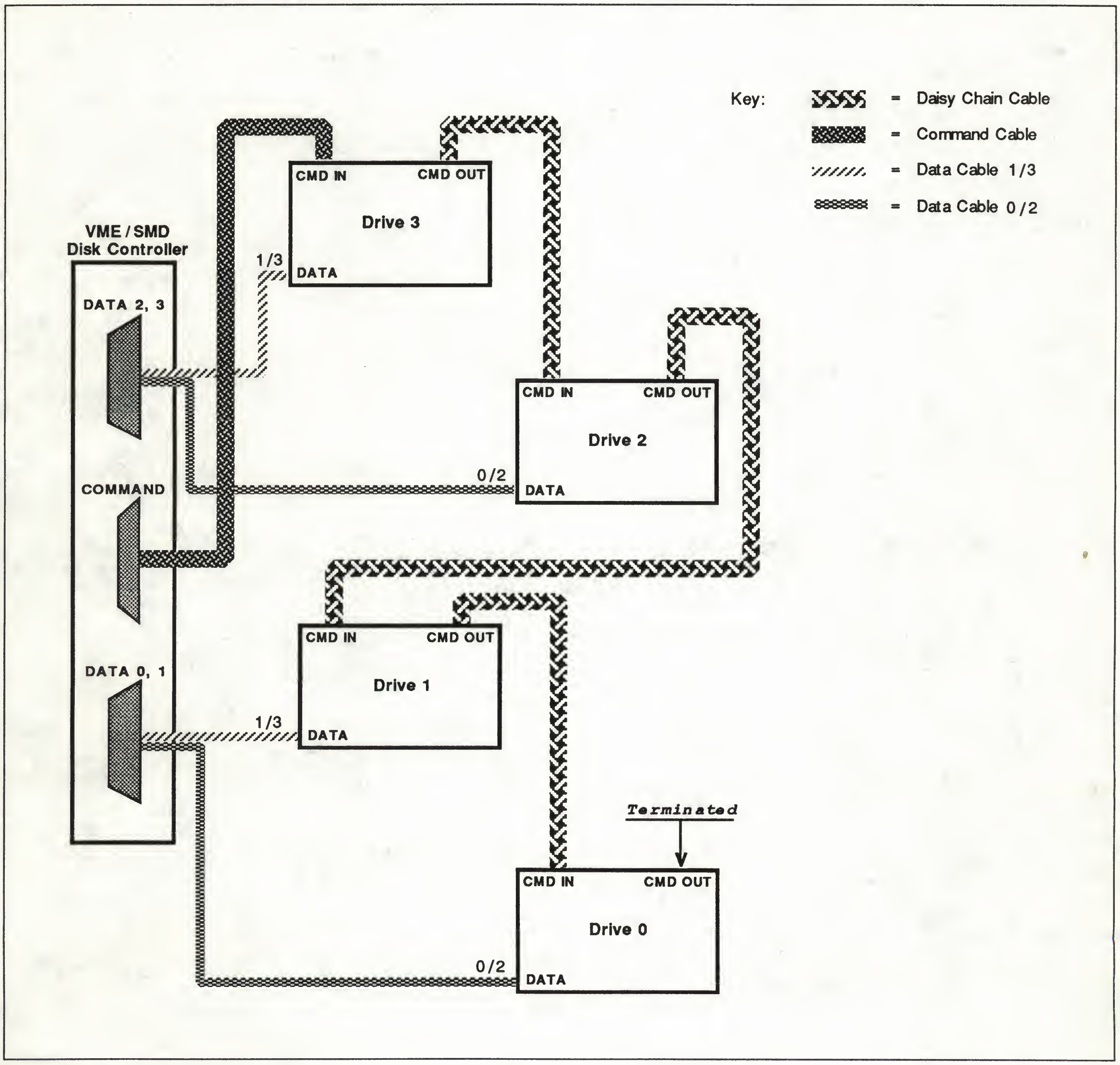


Figure 3-2 *Cabling for all other rack-mountable Sun SMD Drives - Two Drives*

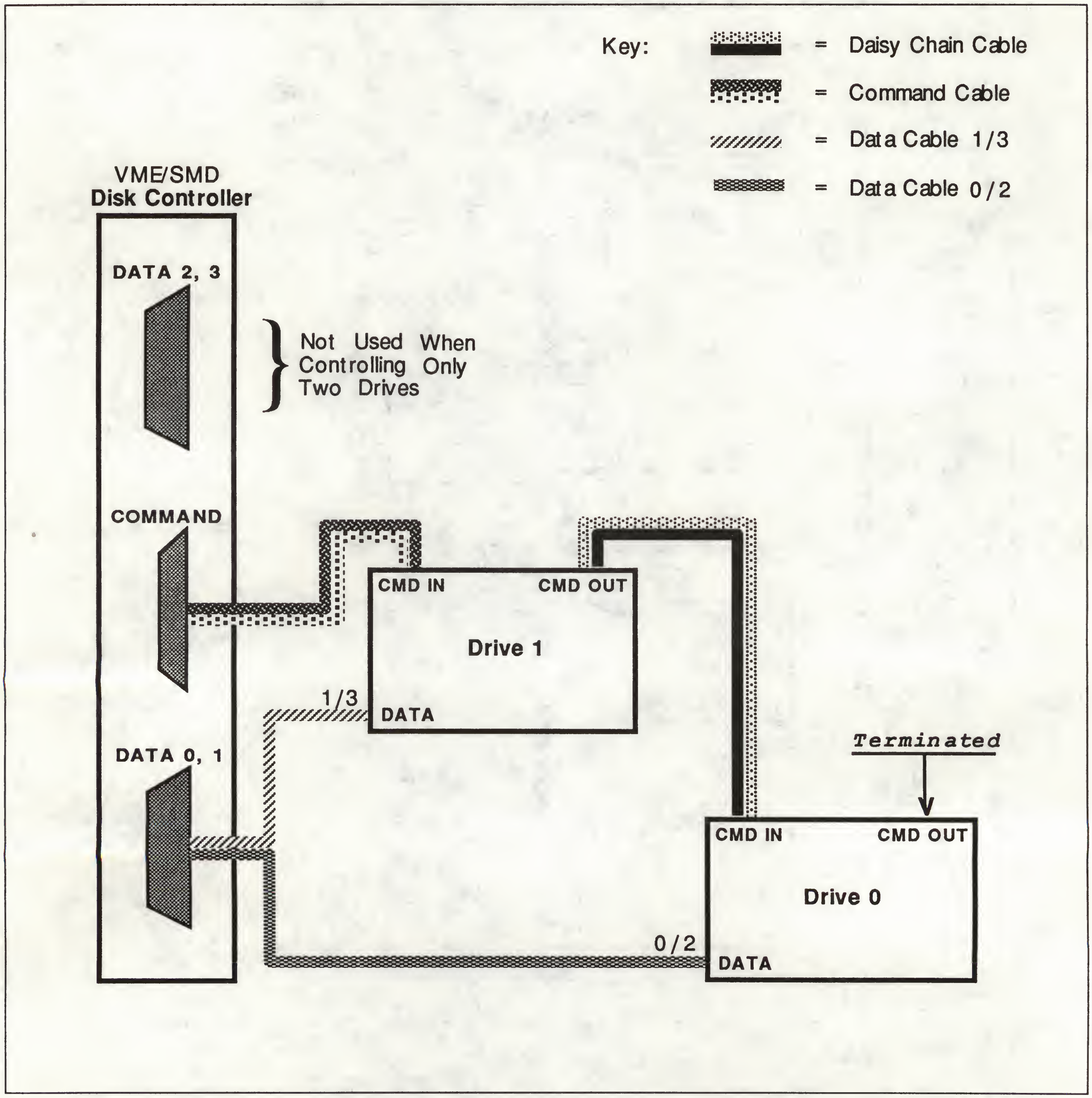
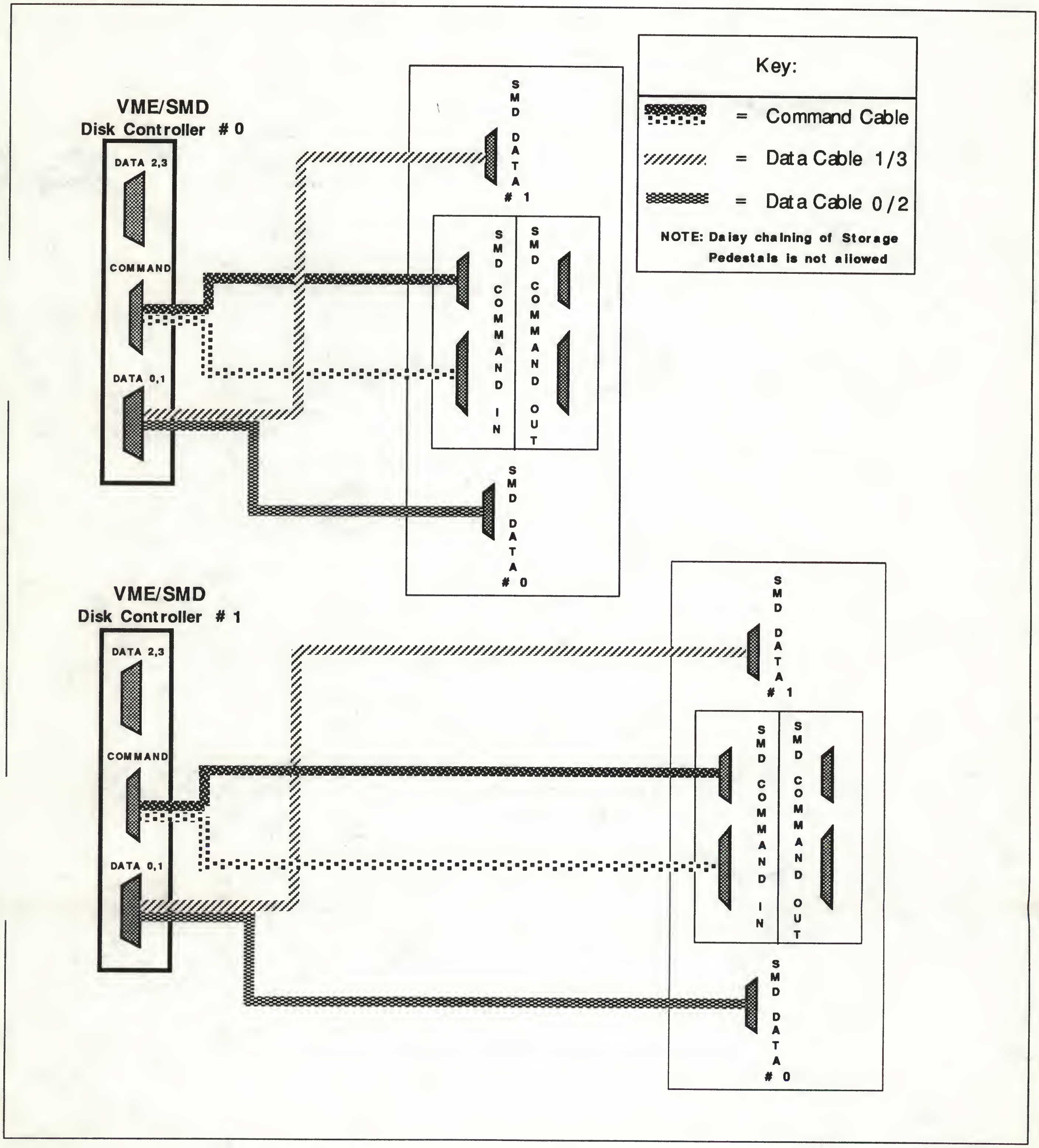


Figure 3-3 *Cabling for Two Sun Mass Storage Pedestals Containing Two Drives Each*



3.2. Upgrade Procedure Completion

Drive Formatting, Partitioning and Labeling

The following Steps will format, partition and label your disk drive(s). After these Steps, your drive(s) will be compatible with your VME/SMD Disk Controller.

NOTE *The actual formatting of a disk drive **can** take up two hours.*

1. Boot with your system disk again. If you were using MUNIX rather than a system disk, bring up MUNIX again and copy the defect list from the tape to memory (you can use the `tar` command for this).

CAUTION **Before running `format` under MUNIX, you must create the proper entries in the /dev directory for the ½-inch tape device used to back-up the defect list. The MAKEDEV command should be used for creating these entries. (If you are using ¼-inch tape cartridges, then you do not need to make entries in /dev.) Furthermore, you must boot MUNIX with the "-asw" flags so as to be able to create these entries. *If these entries are not made,* `format` *will not be able to access your disk.***

2. Re-enter the `format` utility by typing:
   `format`
   After entering the `format` utility, choose the drive you intend to format with the new controller.
3. Enter `defect` (for defect list management) from the `format>` prompt. Load the drive defect list information. You can use the `load` and `commit` commands for this step.
4. Use the `format` command in the format utility to format the drive.

NOTE *The actual formatting of a disk drive **can** take up two hours.*

5. Use the `partition` command in the format utility to partition the drive. **If you wish to use the default partioning, you can skip this step.**
6. Use the `label` command in the format utility to label the drive.

Rebuilding the File System

You are now ready to build a file system or install the SunOS 4.0 Software on your upgraded system. Please refer to *Installing the SunOS* for software installation instructions.

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The Format Utility and MUNIX

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A

The Format Utility and MUNIX

A.1. MUNIX

Before proceeding with examples, a note about MUNIX is in order. MUNIX is a version of SunOS that is loaded from tape or over the network and resides entirely in memory. It does not require a disk from which to load or swap and is therefore a very useful tool if your local disks are unformatted or corrupted. Running `format` under MUNIX is about the same as running it under SunOS, with a couple of exceptions. First, before running `format` under MUNIX, you must create the proper entries for your device in the /dev directory or `format` will not be able to access your disk. The /dev entries are not pre-made for you because there is no way to know exactly which devices you will need ahead of time. For this reason, you must boot MUNIX with the "-asw" flags so as to be able to create the entries. If you wish to modify and save files, you must perform the additional step of saving the files to a scratch tape, as MUNIX stores all its "files" in volatile storage (i.e. ramdisk). The following example shows you how to run `format` in the MUNIX environment.

A.2. Using *format* during System Installation

CAUTION

The procedures described in this section are to be followed with extreme caution. Running format on your disk causes all the data on it to be erased.
Before proceeding:
Make at least one backup of the disk you intend to format, preferably two, since one of the tapes may be faulty.
Make sure you have four megabytes of main CPU memory, as MUNIX requires that much to run.
You may want to run memory diagnostics, just to be sure.

It is sometimes necessary to run the `format` program when you install your system. In particular, if your target system disk has been corrupted or was purchased from a third-party vendor, you will have to format and label the drive before you install SunOS. If the disk was purchased from Sun this is not absolutely necessary because all disks sold by Sun are formatted and labelled at the factory. Also, if you wish to partition your new disk differently than the Sun default partitions, you need to create a partition table and relabel the disk before proceeding with the installation. This section shows you how to use `format` to prepare your system disk in such situations.

In this example, you are installing `xd0` as your system disk. We will assume that the target disk is a Fujitsu 2333, that it was originally formatted by a Xylogics 451 SMD controller, that you are upgrading to a VME/SMD Disk Controller, and that this is the only disk in the system. Such a situation requires the use of MUNIX because the two controllers are not format compatible; therefore, the target disk must be reformatted before anything can be loaded onto it.

To load MUNIX, type the following.

NOTE *Unless otherwise specified, replace "tape" (shown in italics) with* "`st`" *for ¼-inch tape, or* "`mt`" *or* "`xt`" *for ½-inch tape.*

```
>b tape()   (where tape = st, mt, or xt)
Boot:tape(0,0,4) -asw
        .
        .
        .
root filesystem type (spec 4.2 nfs):4.2
root device (rd%[a-h]:rd0a
init ram disk from:tape0a  (where tape = st, mt, or xt)
Tape file number? 5
Swap filesystem type (Spec 4.2 nfs):spec
        .
        .
        .
Swap device (ns%d[a-h]):ns0a
```

The next step is to select the disk you wish to work on via the `format` utility.

If you have ½-inch tape, enter the following commands before entering `format`:

```
# cd /dev
# MAKEDEV tape  (where tape = mt0 or xt0)
```

For both ¼-inch and ½-inch tape, select the disk via `format`, as follows:

```
# format
AVAILABLE DISK SELECTIONS:
        0. xy0 at xyc0 slave 0
        xy0: <Fujitsu-M2333 cyl 821 alt 2 hd 10 sec 67>
Specify disk (enter its number): 0
selecting xy0 <Fujitsu-M2333>
[disk formatted, defect list found]
format>
```

NOTE `xy0` *is the device name for the first disk on the Model 451 controller.*

At this point, note that the disk is already formatted and a defect list is present on it. This should be the case with all disks shipped from Sun. However, if you see the message `defect list not found`, use the **extract** command, mentioned in the next paragraph, to recover the defect list from the disk drive.

Before reformatting the target drive, you need to save its defect list to a safe place, since the VME/SMD Disk Controller cannot read the defect list off a drive formatted by a 451. Note that if your disk was purchased from a third party or is missing its defect list for some other reason, you can use the **extract** command, which examines the disk and builds the defect list for it, based on which defects have been repaired. If you have a new third-party disk, you can use the **original** command to read the manufacturer's defect list that comes with all SMD drives. These commands are explained fully in Chapter 10 of **System Administration and Networking**. Since you will need to switch off the power to install the new controller, you must save the defect list on non-volatile storage. In our example situation, we need to save the defect list to tape, since there is no other disk. The easiest and most reliable way to do this is with the `tar` utility. Before saving the defect list, compare it to the hard copy of the manufacturer's defect list. It should contain all the defects on the hard copy list. It may also contain some defects that were found at the Sun factory. If any of the defects are missing, use the **add** command to add them to the defect list before proceeding.

```
format> defect
    restore  - set working list = current list
    original - extract manufacturer's list from disk
    extract  - extract working list from disk
    add      - add defects to working list
    delete   - delete a defect from working list
    print    - display working list
    dump     - dump working list to file
    load     - load working list from file
    commit   - set current list = working list
    quit
defect> print
    num     cyl     hd     bfi     len     sec
    1        11      6   31858       4
    2        21      4   14820       4
    3       106      7   27403       4
              .
              .
              .
    41      811      0   27738       6
    42      820      4    4502       3
total of 42 defects.
defect> dump
Enter name of defect file: 2333_defs.033537
defect file updated, total of 42 defects.
defect> q
format> q
# tar cvf /dev/rtape0 2333_defs.033537 (where tape = st or mt)
Read file back to verify file(s) is on tape.
# tar tvf /dev/rsf0
# <L1-A>
```

Note that we have put the serial number and model of the disk in the name of the defect file. This is always a good idea, as it lets you match up the defect file with the correct disk easily. If the serial number of the disk is not readily available, use some other unique identifier.

Now that you have saved the defect list on tape, power off the system and install your new controller according to the instructions in the hardware installation manual. Then boot MUNIX in the same manner as before. After making the appropriate entries in `/dev`, use `tar` to read in the defect list. Then execute the format program. Note that we have to specify the *disk* type because the VME/SMD Disk Controller can't read the label of a 451 formatted drive.

If you have ½-inch tape, enter the following commands before reading the defect list from the tape:

```
# cd /dev
# MAKEDEV tape  (where tape = mt0 or xt0)
```

For both ¼-inch and ½-inch tape, continue with the procedure as follows:

```
# cd /
# tar xvf /dev/rtape0 2333_defs.033537 (where tape = st or mt)
# format
AVAILABLE DISK SELECTIONS:
    0. xd0 at xdc0 slave 0
    xd0 <type unknown>
Specify disk (enter its number): 0
selecting xy0 <type unknown>
format> type
     0. Fujitsu-2351 Eagle
     1. Fujitsu-M2333
     2. Fujitsu-2361 Eagle
     3. CMD EMD 9720
     4. Hitachi DK-815-10
     5. NEC D2363
     6. Other
Specify disk type (enter its number): 1
selecting xd0 <Fujitsu-M2333>
Ready to get manufacturer's defect list from unformatted drive.
This cannot be interrupted and takes a long while.
Continue? n
[disk unformatted, no defect list found]
```

NOTE `xd0` *is the device name for the first disk on the VME/SMD Disk Controller.*

NOTE *There will be a 30- to 60-second delay after entering the disk type.*

Now you must load in the defect list and commit it (i.e. make it the *current* defect list) and you will be ready to format the disk with the new controller.

```
format> defect
     restore  - set working list = current list
     original - extract manufacturer's list from disk
     extract  - extract working list from disk
     add      - add defects to working list
     delete   - delete a defect from working list
     print    - display working list
     dump     - dump working list to file
     load     - load working list from file
     commit   - set current list = working list
     quit
defect> load
Enter name of defect file: 2333_defs.033537
ready to update working list, continue? y
working list updated, total of 42 defects.
defect> commit
ready to update Current Defect List, continue? y
Current Defect List updated, total of 42 defects.
Disk must be reformatted for changes to take effect.
defect> q
```

Now you are finally ready to format the *current disk*. The default values for the bounds of the `format` command will cause the entire drive to be reformatted. Also, by leaving the surface analysis parameters in their default state, 2 passes of analysis will automatically be run on the disk when `format` completes. It is recommended that you allow this analysis to complete, in order to verify the integrity of the media. After the format operation has finished, make sure you relabel the disk with the **label** command.

```
format> format
Enter starting block number [0, 0/0/0]: <cr>
Enter ending block number [551409, 822/9/66]: <cr>
Ready to format. Formatting cannot be interrupted
and takes a long while. Continue? y
Beginning format. The current time is Wed Sep  2 16:58:05 1987

Formatting...
Format succeeded.
Verifying media.
     pass 0 - pattern = 0xc6dec6de
     pass 1 - pattern = 0x6db6db6d
Total of 0 defective blocks repaired.
format> label
Ready to label disk, continue? y
format> q
```

If any defects are found during surface analysis, they will be automatically repaired if possible. If the automatic repair did not succeed, you need to repair them manually. See the section on "Repairing a Defective Sector" in Chapter 10 of the System Administration and Networking manual for step–by–step instructions.

If you are happy with the default partitioning of the disk, you are now done with `format`, and can continue your installation. If you wish to change the partitioning of the disk, use the commands in the *partition* menu to create a table, making sure to run the `label` command afterwards to label the *current disk*.

Revision History

Dash Number	Revision	Date	Comments
01	50	March 3, 1988	Engineering release
05	A	August 4, 1988	First production release

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